Implementation of Auctions for Renewable Energy Support in Croatia: A case study

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Publication date:
2016

Report D7.1-HR, March 2016

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Short about the project

Auctions for Renewable Energy Support: Effective use and efficient implementation options (AURES)

This project helps assessing the applicability of different auction types to renewable support under different market conditions. It also explores which auction types and design specifications suit particular requirements and policy goals in European countries. By establishing best practices and a knowledge sharing network, we contribute to informed policy decision-making and to the success of auction implementations across Europe.

Target-oriented analysis: Through analysis of empirical experiences, experiments and simulation, we will create a flexible policy support tool that supports policy makers in deciding on the applicability of auction types and certain design specifications for their specific situation.

Capacity building activities: We undertake specific implementation cases to derive best practices and trigger knowledge sharing amongst Member States. We strive to create a strong network with workshops, webinars, bilateral meetings, newsletters, a website that will serve as capacity building platform for both policy makers and market participants (including project developers, auctioneers, etc.). Wherever required, we can set up specific bilateral and multilateral meetings on specific auction issues and facilitate cooperation and knowledge sharing. Additionally, we offer sparring on specific implementation options, drawing from insights gained during the first phases of the project (empirical analysis of previous auctions in Europe and the world), conceptual and theoretical analysis on the applicability of specific designs in certain market conditions and for certain policy goals issues and facilitate cooperation and knowledge sharing. Additionally, we offer sparring on specific implementation options, drawing from insights gained during the first phases of the project (empirical analysis of previous auctions in Europe and the world), conceptual and theoretical analysis on the applicability of specific designs in certain market conditions and for certain policy goals.

Project consortium: eight renowned public institutions and private firms from five European countries and combines some of the leading energy policy experts in Europe, with an impressive track record of successful research and coordination projects.

This report deals with the planned implementation of auctions for renewable energy support in Croatia from 2016 onwards. The report focuses on the implementation process and provides the necessary background information. Furthermore the planned auction design is described and discussed both from a policy maker's and an investor's point of view. Finally, main strengths and weaknesses are identified and the scheme is discussed according to several success criteria. The proposed design is related to the findings from AURES work packages 2, 3 and 4, which included the identification of success criteria, of appropriate auction formats and suitable design elements for RES auctions, as well as the analysis of past auction implementations.

This report forms part of AURES Deliverable 7.1, which is presented in six separately paginated parts:

D7.1-INTRO	Introduction to the task 7.1 case studies: case selection and methodology
D7.1-ES	Case 1: Spain
D7.1-PL	Case 2: Poland
D7.1-SK	Case 3: Slovakia
D7.1-HR	Case 4: Croatia
D7.1-NL/DK	Case 5: Netherlands – Denmark cooperation

The report contributes to the first of three tasks in work package 7 of the AURES project:

T7.1 Identifying future implementation plans for auctions in Europe
T7.2 Performing specific implementation cases of future auction implementation
T7.3 Model based analysis of the specific cases

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Project deliverable:
WP7 – Future implementation possibilities for auctions in Europe.
Task 7.1 specific implementation cases

AURES; a coordination and support action of the EU Horizon 2020 program, grant number 646172.

Disclaimer

This report has been prepared in good faith on the basis of information available at the date of issuing without any independent verification. Documents in Croatian language have been used without official translation, so translation errors or misunderstandings might have occurred. DTU does not guarantee or warrant the accuracy, reliability or completeness of the information presented here nor its usefulness in achieving any purpose.

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1 Description of market conditions and RES auction status

Country characteristics

The Republic of Croatia joined the European Union (EU) as the 28th member state on 1 July 2013. With a population of 4.26 million and a size of 56,594 km2 it belongs to the smaller half of the countries in EU. Croatia has GDP per capita 10.600 Euro (nominal) as of 2014 (Eurostat, 2015), ranking third last after Romania and Bulgaria.

After six years of recession, Croatia's GDP is finally expected to grow again in 2015 and 2016. However, despite the positive outlook the current unemployment rate of 17% is not expected to decline significantly (European Environment Agency, 2014). Since 2008 the final energy consumption per capita has decreased slightly and remains well below the European average (IEA, 2014). As of 2014, 48% of the final consumption of power and heat is used for residential purposes, 21% by the industry, and 28% for commercial and public services.

Electricity market characteristics

Croatia's energy sector is undergoing significant changes in relation to the country's accession into the EU. The Third Energy Package has been transposed into the national legislation and the energy markets have been liberalised.

The Croatian electricity market is dominated by the wholly state owned HEP Group, who owns approx. 89% of generation capacity as well as the transmission and distribution net. Given the monopolistic structure of the market, power sales and purchases are based on bilateral agreements between supplier, trader or producer and a costumer. However, The Electricity Market Act (Zakon O Tržištu Električne Energije, 2013) with effect from 2 March 2013 introduced an electricity stock exchange (Herbert Smith Freehills, 2014), which came into operation 10 February 2016, under the name of Croatian Power Exchange ltd (CROPEX). The power exchange is responsible for organising and operating the day-ahead market in Croatia (Garaca, 2016). It is currently unknown whether the HEP group's generation and supply units will participate in the CROPEX market, and it is therefore uncertain to what extend the market will replace the bilateral agreements. The Electricity Market Act also simplified the licensing regime for power traders and suppliers.

The electricity market has been fully liberalized since 1 July 2008, leaving all consumers to freely choose electricity supplier (Herbert Smith Freehills, 2014). The key supplier in Croatia belongs to the HEP group, however, in 2013 the German energy company RWE and Slovenian GEN-I entered the electricity supply market.

The Electricity Market Act required the HEP Group to unbundle its transmission system business from its generation business. The transmission system operator remains a part of the HEP Group, however, in order to ensure independence it is submitted to strict regulations (Herbert Smith Freehills, 2014).

The average electricity price in Croatia was 0.132 Euro per kWh for households and 0.092 Euro per kWh for industries during the first half of 2015. This is well below both the EU-28 average and the prices of its neighbor to the north, Slovenia, but double of the average price in Serbia and Bosnia and Herzegovina to the south-east (Eurostat, 2015).

In 2013, Croatia's net import of power was 4490 MWh equal to almost 30% of the total electricity consumption (IEA, 2014). As of 2013 60% of the generated electricity comes from hydropower plants while coal- and gas-fired plants contribute with 18% and 15% of the power production, respectively. Furthermore, wind power constitutes 4% of the total production and biomass is the source of 1%. Power from solar PV is insignificant with less is than 0.1% (IEA, 2014).

Key figures for RES-E

Table 1: Overview of RES in Croatia

Existing support scheme type/types	Feed-in tariff for renewable energy and loans for investments through Croatian Bank for Reconstruction and Development (HBOR) (European Environment Agency, 2014)
Renewable share on total energy production	41% as of 2013 (IEA, 2014)
Renewable share on final energy consumption	27.9% as 2014 (Eurostat, 2016)
Total energy production	41.87 GWh as of 2014 (Eurostat, 2015)
Technology focus 2015-2020	Tbd.
Compliance with RES targets	Target: 20% renewables in 2020.

RES targets and technology focus

The overall goals for the development of Croatia's energy system are described in the Energy Strategy of the Republic of Croatia published by the Croatian Ministry of Economy, Labour and Entrepreneurship in 2009.

The focus points for the Energy Strategy are:

- Security of energy supply;
- Competitive energy system;

- Sustainable energy sector development.

Stimulation of the use of renewable sources in the production of electricity as well as in the heat supply is presented as an appropriate measure for reaching the goals.

Croatia's National Action Plan for Renewable Energy Sources (NREAP), adopted in October 2013, defines the 2020-target for the share of renewable energy in gross final energy consumption by 20.1% in line with the overall goal of the European Union. The target includes 39% share of renewable energy sources in the electricity consumption, 10% share in transportation and 19.6% share in heating and cooling (Ministry of Economy, 2013).

According to the NREAP, the expected distribution between technologies in the RES-based electricity production by 2020 is 79% from hydropower plants, 10.5% from wind power plants, 9.3% from biomass-fueed plants. Geothermal and solar PV plants are expected to contribute with 0.7% and 0.9%, respectively.

The table below presents the targets given in the National Action Plan for inclusion of renewable energy sources for electricity production (RES-E) together with the installed capacities as of 2014.

Table 2: Installed capacity and capacity targets.

Type of the plant	Installed capacity 2014* [MW]	Capacity target 2015 [MW]**	Capacity target 2020 [MW]**
Wind	339	400	400
Solar	33	52	52
Small hydro power (< 10 MW)	30	59	100
Large hydro power (> 10 MW)	1870	2108.1	2356
Solid biomass	8	42.5	85
Biogas	16	15.2	40
Geothermal	0	5	10
Landfill	0	n/a	n/a
Sewage gas	0	n/a	n/a
Total	2296	2681.8	3043

*Source: Eurostat, 2016. ** Source: National Action Plan For Renewable Energy Sources, Table 10b (Ministry of Economy, 2013)

From 2015 there is no increase in installed capacities of solar and wind power planned in the NREAP, while further increase in capacities of hydropower, geothermal and biomass based power generation is expected.

Concentrated solar energy plants are not considered a relevant option and all solar power is expected to come from photovoltaic systems.

In order to meet the 2020-target for renewable energy the NREAP prescribes an increase in heating based on renewable sources, including solar heat collectors, heat pumps, and biomass based heating. Cogeneration of electricity and heat is considered an important measure for increasing the energy efficiency, and the target for share of electricity produced with cogeneration is 4% by 2020.

Since 1 January 2013 Croatia has been included in the European Union's Emission Trading System (EU ETS). The 2020 target for Croatia is a 21% reduction of emissions from sectors covered by EU ETS, while a total increase of 11% compared to 2005 levels is permitted for non-EU ETS sectors (Herbert Smith Freehills, 2014). Furthermore, in 2013 Croatia developed a Low-emission Development Strategy setting the 2050 emission targets while defining relevant measures (UNDP, n.d.).

Main pillars of current RES-E support policy

The legislative framework for supporting the development of power generation based on renewable energy sources consists of an incentive system including mandatory power off-take and a feed-in tariff. The level of the feed-in tariff is differentiated for technology and installation size. Current tariff levels are presented in Table 3. For large plants the tariff is determined according to a reference price, which is calculated on daily basis (RES LEGAL Europe, 2014). All feed-in tariffs are inflation-adjusted on basis of the consumer price index. The support contracts are valid for 14 years.

Table 3: Feed-in tariffs in Croatia under past support scheme.

Technology type	**Plant capacity**	**Feed-in tariff as of 2013 [HKR per kWh]**
a. Solar power	Roof-top - ≤ 10 kW - 10-30 kW - 30-300 kW Ground-mounded - ≤ 5MW	 1.91 (2.29) 1.70 (1.87) 1.54 (1.59) Tariffs in parentheses indicate adjusted values if the installations are also used for hot water or heating. Reference price
b. Hydro power	- ≤ 300 kW - 300 kW – 2 MW - 2 MW – 5 MW - > 5 MW	1.07 0.93 0.88 Reference price
c. Wind power		Reference price
d. Biomass	- ≤ 300 kW	1.30

	- 300 kW – 2 MW - 2 MW – 5 MW - > 5 MW	1.25 1.20 Adjusted with coefficients 0.9, 1, and 1.2 for plant efficiencies <45%, 45-55%, and >55%, respectively. Reference price
e. Geothermal		1.2
f. Biogas	- ≤ 300 kW - 300 kW – 2 MW - 2 MW – 5 MW - >5 MW	1.34 1.26 1.18 Reference price

Source: RES LEGAL Europe, 2014

In order to qualify for the feed-in tariff, the planned project has to obtain status as 'eligible producer'. All technology types and capacities presented in the table of feed-in tariffs qualify for the eligible producer status, however, there are currently no large hydro power plants included in the scheme. This can be explained by the fact that most hydro power plants are fairly old and that they are considered able to operate under market conditions without additional support.

In Table 4 on the following page the installed and contracted capacity of eligible producers are presented together with information on the number of plants, average plant size and the number of plant owners. It is worth noticing that the combined amount of installed capacity and contracted capacity exceeds the 2020-targets given in Table 2 for all technology types except small hydro power. Another interesting fact is the apparently rather high actor diversity, suggested by the large number of plant owners.

As an additional support measure the Croatian Bank for Reconstruction and Development (HBOR) provides financing options for renewable energy projects through loans covering up to 75% of the project costs. The loans are available under Loan Programme for Environmental Protection, Energy Efficiency and Renewable Energy. Furthermore, the Fund for Environmental Protection and Energy Efficiency awards interest-free loans to renewable energy projects (RES LEGAL Europe, 2014).

Table 4: Eligible producers installed capacity, contracted capacity as of January 2016, number of plants, average plant size, range of plant sizes, and the number of owners of the installed capacities

Eligible Producers					
Type of the plant	**Installed capacity [MW]**	**Contracted capacity [MW]**	**No of installations**	**Average plant size (range) [kW]**	**Number of owners**
Wind	383.75	360.2	18	21,319 (25,000-43,000)	16
Solar	43.98	11.00	1213	36.2 (2.5-1000)	673
Hydro	2.99	4.93	8	373 (15 -1400)	8
Solid biomass	24.59	95.25	10	2,458.5 (60 – 8600)	10
Biogas	21.93	34.03	18	1,218.5 (135 – 2000)	13
Geothermal	0	10.00	-	-	-
Landfill	3.00	0	1	3,000	1
Sewage gas	2.50	0	1	2,500	1
Total	482.74	515.41			

Source: Croatian Electricity Market Operator, 2016. The number of owners is determined according to unique company names of the eligible producers, and does not take into account possible ownership relations between the companies.

Auction status

The Act on Renewable Energy and High-efficiency Cogeneration (Zakon O Obnovljivim Izvorima Energije I Visokoučinkovitoj Kogeneraciji, 2015) came into force on 1 January 2016 prescribing the general guidelines for conducting auctions for RES support in Croatia. However, bylaws describing the implementation of the auctions are yet to be adopted and such bylaws are currently being prepared. A draft under the name 'Regulation on Renewable Energy Sources and high-efficiency cogeneration' which contains suggestions for specific design parameters, has been made publicly available (Pravilniko Obnovljivim Izvorima Energije Visokoučinkovitoj Kogeneraciji, 2016). The proposed regulation contains detailed description of the auction implementation, but since a new government assumed office on 22 January 2016 following the parliamentary elections on 8 November 2015, it is possible that the draft regulation becomes subject to major changes. For the same reason, it is considered unlikely that the first auctions will be held during 2016.

2 Planned auction design

The information presented below is based on a review of the Croatian Act on Renewable Energy Source and High-Efficiency Cogeneration (Zakon O Obnovljivim Izvorima Energije I Visokoučinkovitoj Kogeneraciji, 2015) as well as the draft bylaw Regulation on Renewable Energy Source and High-Efficiency Cogeneration (Pravilniko Obnovljivim Izvorima Energije Visokoučinkovitoj Kogeneraciji, 2016). Both documents are currently only available in Croatian, please note the Disclaimer in the beginning of the report.

General characteristics of the planned or proposed auction

Table 5 Characterisation of planned or proposed auction

Characteristics	Description
Name of auction scheme	Currently no name of the auction scheme exists, however, the scheme is introduced in the Act for Renewable Energy Sources and High-efficiency Cogeneration
Objectives	The objective of introducing an auction scheme is to support the construction of new power production plants based on renewable energy source and high-efficiency cogeneration.
Contracting authority	Croatian Energy Market Operator - Hvratski Operator Trzista Energije d.o.o., in short HROTE
Main features	Two different auctions are presented in the Act – the first offers a sliding premium for plants with capacity greater than 30 kW, and the second a guaranteed purchase price for plants smaller than 30 kW. The Act prescribes a multi-technology scheme in which all types of power generation based on renewable energy sources as well as high-efficiency cogeneration can participate. It describes the option of introducing quotas for specific technologies and/or installation sizes.
Technological diversity (focus and differentiation)	The auctions schemes include both power production based on renewable energy sources and high-efficiency cogeneration of power and heat.
Year of introduction	Bylaws are to be adopted during 2016, and the first auction is expected to be performed in 2017.

Lead time before auction	- 3-6 months from announcement of auction to deadline for submitting bids. - Maximum 60 days from deadline to announcement of selection results.
Periodicity/Timing of the auction	Annually or semi-annually
Auction Volume (What is auctioned?)	The auction volume will be determined in terms of kW new generation capacity. The auction volumes and quotas are not yet determined.
Budgetary expenditures per auction and per year	Tbd.
Size limits (Min./max. size of projects)	Tbd.

Specific design elements of the planned or proposed auction

Most of the specific design parameters such at pre-qualification criteria, penalties for delays, overall quotas, and separate quotas for the different technologies are all parameters to be defined in bylaws, which are expected to be developed during the first half of 2016. In January 2016 a first draft for the bylaw named Regulation on Renewable Energy and High-efficiency Cogeneration was made publicly available (Pravilniko Obnovljivim Izvorima Energije Visokoučinkovitoj Kogeneraciji, 2016). Specific design parameters of the auction as proposed in the draft bylaw are presented in the table below together with the parameters presented in the adopted Act on Renewable Energy Sources and High-efficiency Cogeneration (in the following referred to as Act). The italic text style is used to indicate that the stated design parameter is proposed in the bylaw (in the following referred to as Regulation), and not yet adopted.

Table 6: key design elements for planned RES auctions in Croatia

Design Elements	
Auction format (Single- or multi-item auctions)	Homogenous multi-item

Auction type (static or dynamic)	*Static auction with sealed bids. Only one bid for each production installation.* Within the auctions there will be capacity quotas for different installation types (Article 28, Act). *Plant types can be found in Table 7. (Article 68 and 79, Regulation)* Quotas for the promotion of renewable energy sources and high-efficiency cogeneration shall be determined by the Croatian government on the basis of the Energy Strategy of the Republic of Croatia, National Action Plan for Renewable Energy Sources, National Action Plan for Energy Efficiency and other regulations (Article 28, Act).
Selection criteria	- Sliding Premium scheme: Lowest offered reference value stated in HRK / kWh, which is lower than the maximum reference value (Article 32, Act). - Guaranteed purchase price scheme: Lowest offered price stated in HRK / kWh, which is lower than the maximum price (Article 35, Act). *In case bids have same reference value, the bid with the smallest generation capacity is selected (Article 74, Regulation).* The decision on the selection of the winning bidder is valid for 5 years (Article 16, Act).
Pricing rule	Pay-as-bid
Price limits	The maximum reference value (used in premium schemes) as well as maximum guaranteed prices are determined by the Croatian Power Market Operator (HROTE) on annual basis. *The maximum guaranteed purchase price is determined as the amount in HRK / MWh, which corresponds to production costs of electricity produced in a reference plant for a particular group of installations (Article 56, Regulation). The group of plants are determined according to Table 7.*
(Pre-)qualification criteria	Potential bidders have to obtain a preliminary status of 'Eligible Producer' in order to participate in the auction. *The installations which fits into the categories presented Table 7 can get status as eligible producers.* *The bidders must present an obtained building permit or other document*

	authorising the construction of the plants. Grid connection approval, including documentation for being entitled to use the land, must also be presented as part of the bid (Article 80 and 69, Regulation). *Furthermore, a bidder must document that they have paid all required taxes, health insurances and pensions for employees together with the bid, as well as produce a certified statement, ensuring that the person responsible for the bid has not been convicted of bribery, fraud or similar crimes (Article 69 and 80, regulation).* *In order for cogeneration to be considered in the auction, the cogeneration unit has to fulfil special conditions on efficiency depending on fuel type. For plants using fossil fuel, the primary energy savings (a measure of the increased energy efficiency when using cogeneration instead of separate heat and power generation) need to be either >0% or >10%, depending on the requirements for obtaining status as eligible producer for the specific plant. For cogeneration based on RES, it is a requirement to have an overall efficiency greater than 50% (Article 24-25, Regulation).*
Penalties	*In order to guarantee the seriousness of bids, a first bid bond of 50 HRK per kW must be placed in a special bank account of the Croatian Electricity Market Operator (HROTE), alternatively, in terms of unconditional bank guarantees. In case a winning bidder does not sign the contract with HROTE the amount will be retained (Article 70, Regulation). Similarly, in case of manipulations with documentation or data, or if there exist reasons to believe that bids within one installation group have been coordinated, the guarantees will not be returned (Article 70, Regulation).* *As a warranty of construction a second bid bond pf 300 HRK per kW of planned capacity has to be placed by the winning bidders within 15 days of the notification of the winners. In case the winner does not exercise the right for market premium before the agreement expires, the submitted amount shall not be returned (Article 76, Regulation).* *In case the installation is not ready to start operation within the maximum construction period (see grace time under Other Specific Regulations), the agreement is cancelled (Article 96, Regulation).* Fines of 1,000.00 to 50,000.00 HRK can be imposed in case the eligible producer fails to maintain the technological requirements needed for obtaining the status as eligible producer, fails to submit the required documentation, fails to maintain metering equipment, or conducts

	changes in installations without prior consent (Article 48, Article 19, Act). Furthermore, fines between 300.00 and 50,000.00 HRK can be given to the responsible person within the entity which obtained status as eligible producer (Article 48, Act). *In case of premature termination of the contract, the entire amount of already received support is to be reimbursed with an addition according to the Croatian rules of state aid (Article 99, Regulation).*
Actor diversity (Exceptions from requirements for small plants/developers?)	- Small producers (< 30 kW) can participate in a separate auction in which guaranteed prices are offered. - *Quotas are offered according to installation type which is determined according both technology and plant capacity. This opens for the possibility to have special quotas for small plants under the premium scheme.*

Remuneration type	For the premium scheme a sliding premium, defined as the difference between the bidded reference value and the reference market price, is offered. In case the premium value is negative, no remuneration is paid. $$P_i = RV - RMP_i$$ Where RV is the offered reference value, P_i is the premium in accounting period i, and RMP_i is the reference market price in accounting period i. *The reference market price is calculated over an accounting period of one month (Article 63, Regulation) and as the product of the average of the hourly day-ahead price (Article 65, Regulation) and a correction factor. The hourly day-ahead price is calculated with the formula below:* $$RDAP_i = \frac{CROPEX_i * vol_i^{CROPEX} + (HUPX_i - PK_{HR\rightarrow HUi}) * vol_i^{HUPX} + (SIPX_i - PK_{HR\rightarrow SLOi}) * vol_i^{SIPX}}{vol_i^{CROPEX} + vol_i^{HUPX} + vol_i^{SIPX}}$$ *Where $CROPEX_i$ is the day-ahead price in hour i of the Croatian power exchange CROPEX and vol_i^{CROPEX} is the total volume traded in hour i at CROPEX. Likewise are $HUPX_i$ and vol_i^{HUPX} the day-ahead price and traded volume in the Hungarian power exchange HUPX, and $SIPX_i$and vol_i^{SIPX} are the price and volume of the Slovenian power exchange BSP Southpool. $PK_{HR\rightarrow HUi}$ is the price for the cross border transmission capacity between Croatia and Hungary and $PK_{HR\rightarrow SLOi}$ is the price for the cross border capacity between Croatia and Slovenia. Then the reference market price is given as:* $$RMP = \sum_{i=1}^{n} \frac{RDAP_i}{n}$$ *For wind and solar the average market price shall be weighed with the power generation in each hour from wind and solar plants, respectively (Article 65, Regulation):* $$RMP_{SP} = \frac{\sum_{i=1}^{n} RDAP_i * SP_i}{\sum_{i=1}^{n} SP_i}$$ $$RMP_{WP} = \frac{\sum_{i=1}^{n} RDAP_i * WP_i}{\sum_{i=1}^{n} WP_i}$$ *SP_t and P is the net delivered solar and wind power, respectively. RMP_{SP} and RMP_{WP} is the reference market price for solar and wind power, respectively.* *The correction factor, which is then multiplied with the calculated reference price, is set to 0.95 for solar power, 0.85 for wind power and other generation technologies for the first year after realisation of*

	support right and increased linearly every year until it reaches the value of 1 in the final year of the contracted support period (Article 64, Regulation). *Furthermore, from two years after obtaining status as eligible producer cogeneration plants are awarded with the market premium multiplied with a correction factor, k, which is determined according the achieved efficiency of the plant. k = 0 if achieved efficiency η < 30%, k= 1.5*(η-0.3)+0.7 if 30% < η < 70%, and k = 1.3 if η > 70% (Article 67, Regulation).* For the guaranteed price scheme the guaranteed price is paid for the net power delivered. Premium and guaranteed prices are adjusted yearly according to the consumer price index (Article 32, Act). Premium and guaranteed purchase price contracts are valid throughout 12 years.
Other specific regulations (e.g. limits on maximum granted support per project)	*Grace period is determined according to the voltage level of the grid connection of the installation:* *1 year – low voltage grid* *3 years – grid with 10 kV or 20 kV* *4 years – grid with 30 kV or more* *In case the plants are not ready to operate within the specified time the agreement on market premium or guaranteed prices shall be cancelled (Article 96, Regulation).*
Transferability of support right	The option of transferring the support rights is not defined, however, transferring of the rights of construction or part of the buildings can be done in accordance with regulations of management of state assets (Article 15, Act). *During the validity of the decision of the eligible producer status, the rights and obligations of the eligible producer can be transferred to another entity (Article 41, Regulation).*

Additional information regarding characteristics and design elements

In Table 7 below the different types of plants included in the proposed auction scheme are presented. Generally plants are divided into technology type and capacity.

It is not yet specified in the regulation whether quotas have to be created for each of the above mentioned installation categories, for all of categories together, or alternatively if a common quota for a subset of the categories is allowed.

Table 7: Installation categories proposed in bylaw (Article 5, Regulation).

Technology type	**Subcategory (plant capacity or technology sub-type)**
a. Solar power	1. < 10 kW 2. 10-30 kW 3. 30-500 kW 4. 500 kW - 10 MW 5. > 10 MW
b. Hydro power	1. < 500 kW 2. 500 kW – 10 MW 3. > 10 MW
c. Wind power	1. < 30 kW 2. > 30 kW
d. Biomass	1. < 30 kW 2. 30-500 kW 3. 500 kW - 2 MW 4. 2-5 MW 5. > 5 MW
e. Geothermal	All capacities
f. Biogas	1. < 30 kW 2. 30-500 kW 3. 500 kW - 2 MW 4. 2-5 MW 5. > 5 MW
g. Liquid biofuel	1. < 500 kW 2. > 500 kW
h. Other kinds of renewable energy	1. Wave energy, all capacities 2. Hydrothermal, all capacities 3. Unspecified, all capacities
i. Cogeneration using fossil fuels, waste and other fuels	1. < 30 kW 2. 30 kW – 1 MW 3. 1 MW – 10 MW 4. > 10 MW
j. Hybrid production installations	1. < 30 kW 2. > 30 kW

3 Similarities and differences of the planned or proposed auction to existing designs

Auction format and scope

The proposed scheme for renewable energy support in Croatia is a multi-item auction in which quotas may be designated to specific technologies and plant sizes, or alternatively, comprise a larger subset of installation types. This means, that the auctions can be either technology-specific or technology-neutral depending on how quotas are defined. Auction formats where different technologies compete in the same auction are for instance used in the United Kingdom, the Netherlands and California. In none of the three examples has the government set capacity quotas for specific technologies (as is suggested in the Croatian scheme). In the UK and the Netherlands, differentiation is achieved through technology-specific ceiling prices.

In the Croatian auction scheme high-efficiency cogeneration is allowed to participate, even with plants using fossil fuels. Combined heat and power generation can contribute to reaching the country's energy efficiency targets, which may explain the inclusion of this technology in the scheme. To date, no other schemes for auctions of RES support in Europe include fossil fuel based technologies.

The Croatian scheme proposes auctions even for very small installation sizes of <30 kW. In most other auctions schemes, such small installations are exempt from having to participate in an auction. The minimum size is e.g. set at 5 MW in the UK, 3 MW in California, 100 kW in the German pilot PV auction. Even the French auction for small-scale PV (up to 250 kW) has a minimum plant size of 100 kW.

Remuneration

The sliding premium which will be offered for installations with capacity greater than 30 kW is a common way of designing the remuneration. It is for instance used in Germany, the United Kingdom, Denmark, and the Netherlands. The proposed auction design suggests calculating the reference market price over a period of one month, which is equivalent to the accounting period used in the German premium scheme. Furthermore, in Germany, the reference market price for wind and solar power is also weighted according to the total generation of the respective technology group.

The scheme for guaranteed purchase prices is targeted towards small individual producers typically with roof-top solar PV, who are unable to participate in the daily bidding on the power exchange. Similarly, feed-in tariffs are offered for small producers in Poland, however, the capacity limit separating small from large installations is set to 500 kW in Poland, which is greater than the 30 kW in Croatia.

In the Croatian auction design, the inflation risk is assumed by the support-paying party and thus the electricity consumers, as both the premium and guaranteed purchase price will be adjusted with the consumer price index on an annual basis. A similar correction can be can be found for the premiums offered under the

proposed Polish auction scheme. Overall, including indexing of the RES support in auction schemes is an exemption rather than a rule. Generally the risk of inflation has to be assumed by the investor. It is likely that the inflation adjustment has been included for historical reasons, as similar correction is applied to the feed-in tariffs in the past scheme.

Another interesting feature in the Croatian scheme is using the neighboring countries' power exchange when calculating the reference price. This could also be interpreted as an alignment of the new regulation to the existing, as the reference price currently used for balancing power is calculated as the hourly average of the Hungarian power exchange, HUPX, and the Slovenian power exchange, BSP Southpool (Croatian Electricity Market Operator, n.d.). Croatia's own power exchange has only been in operation since 10 February 2016, while well-established day-ahead markets, which can be used to determine the reference market prices, are generally found in the other EU countries.

Finally, the reference market value is multiplied with a correction factor, which is 0.95 for solar PV and 0.85 for all other technologies and increased linearly every year until it reaches 1 in the final year of the support contracts. This correction factor functions as a bonus payment, which is highest the first year and decreasing throughout the contract period. With a starting correction factor of 0.95, solar PV is in fact placed in a worse bidding position compared to all other technologies.

Capital requirements

Providing a financial security to ensure the seriousness of bid is in line with other auction schemes such as the German experiences with auctions for ground-mounted solar PV (Tiedemann, 2015). The first bid bond, which is handed in during the bidding process, is in the Croatian draft regulation proposed to be 50 HRK per kW (approx. 6.5 EUR per kW), which is slightly higher than the 4 EUR per kW used in the German case. On the other hand, the second bid bond that has to be submitted by the auction winners, amounts in the Croatian requirements to 300 HRK per kW (approx. 40 EUR per kW), which is somewhat lower than the 50 EUR per kW in the German auctions. Despite the differences between the first and second bid bond in the two cases, the approach and levels are comparable.

Grace time and penalties

In the proposed auction scheme in Croatia the grace time is determined according to the voltage level of the grid to which the plant is connected. This feature is very uncommon and has to the knowledge of the authors not been seen in other countries, where grace periods typically are differentiated per technology.

The Croatian draft regulation prescribes that support agreements are cancelled upon delay of the contracted project. In comparison, many other auction schemes, including e.g. the German auction for solar PV allows

additional grace periods for certain delays in which the developer obtains a partial cut in the support level, until a final date after which the agreement is cancelled.

4 Implementation process

Timing

On 1 September 2015 the Croatian government initiated the legislative procedures for changing the Croatian support scheme for renewable energy, with the intention to make the scheme comply with EU legislation (Boromisa, 2015). The Act on Renewable Energy Sources and High-Efficiency Cogeneration was then adopted on 10 September and came into force on 1 January 2016 (Boromisa, 2015). The implementing regulations (bylaws) are currently under development and a first draft of the regulations has been made publicly available for consultation. It is, however, unclear to what extend the draft reflects the final version of the regulation, as the political landscape in Croatia has changed since the parliamentary elections on 8 November 2015, which lead to a new government assuming office on 22 January 2016.

Responsibilities and roles

The Act on Renewable Energy and High-efficiency Cogeneration was prepared by the Croatian Economy Ministry, passed by the Croatian Parliament and signed by the Speaker of Parliament, Josip Leko. The draft regulation has been proposed by the by the former Minister of Economy, Ivan Vrdoljak, who was replaced with Tomislav Panenić when the new government came into office in January 2016.

The Ministry of Economy is responsible for finalising the implementing regulation (bylaws), which then must be passed by the parliament as well. The Ministry of Economy is also responsible for setting the yearly quotas to be auctioned.

Finally, it is the Croatian Electricity Market Operator (HROTE) who is responsible for the conduction of the auction, including publishing the details regarding the auction participation, collecting bids, opening bids and naming the auction winners as well as concluding contracts with the winning project holders.

5 Stakeholder opinions

Available sources

In relation to the analysis of the auction scheme in Croatia one interview was carried out with a representative from the Croatian Energy Market Operator (HROTE). Furthermore, opinion pieces available online are used as sources, together with the comments from stakeholders to the draft regulation, which were collected during the public consultation until 15 January 2016. The draft together with comments from stakeholders is published online (Pravilniko Obnovljivim Izvorima Energije Visokoučinkovitoj Kogeneraciji, 2016). The stakeholders who have publicly commented on the draft regulation include:

- Croatian Energy Market Operator (HROTE)
- HEP - Operator distribucijskog sustava d.o.o. (Croatian Distribution System Operator Ltd.)
- Hrvatski operator prijenosnog sustava d.o.o (Croatian Transmission System Operator Ltd)
- Croatian Chamber of Economy (CCE)
- Hrvatska elektroprivreda d.d (HEP d.d.)
- CRODUX Energetika d.o.o,
- Novamina centar inovativnih tehnolgija (NOVAMINE Technology Innovation Center),
- Uni viridas d.o.o
- INA Industrija nafte d.d.
- Vanja Marković (unknown affiliation)
- Joseph Barbir (unknown affiliation)
- Marijan Kalea (unknown affiliation)

Opinions on the implementation process

In her blog post from 18 December 2015, Dr. Ana-Maria Boromisa, a senior research fellow at the Institute for Development and International Relations (Zagreb, Croatia) comments on the Act for Renewable Energy Sources and High-Efficiency Cogeneration describing the conditions under which the law was prepared. According to her, transparency and predictability of the implementation of the new law have suffered due to speeded procedures and lack of publicly available information.

Several stakeholders, including the company CRODUX Energetika d.o.o., the state owned power producer Hrvatska elektroprivreda d.d. (HEP d.d.), and the Croatian Chamber of Economy (CCE) state that they found the duration of the consultations too short. In particular CCE notices that due to the limited consultation time it was not possible to get a statement from the banks regarding the possible implications of the proposed support scheme on their willingness to continue financing renewable energy projects.

Short consultation period, lack of analysis and several grammatical and structural mistakes in the proposed law, as pointed out by some commentators, are interpreted as the result of a rushed implementation process.

Opinions on the general auction design

Many details of the auction design are still unclear and yet to be determined. HEP d.d. and the CCE express the wish for a comprehensive analysis of the implications of the new law. A general concern about too much uncertainty is expressed by both HEP d.d. and Joseph Barbir. The latter further alleges that the uncertainty could lead to lack of interest among private investors. Under the feed-in tariff system, the revenues of the renewable power plants were to a great extend predictable, however, the premium scheme brings increased uncertainty regarding the return of the investments. Allegedly, the banks are likely to require a more detailed description of the mechanisms of the new support systems in order to help with the financing of projects.

Opinions on pre-qualification criteria

The new regulation has also been criticised for introducing a high degree of bureaucracy. According to HEP d.d. a heavy administrative burden is related to the registration as eligible producers, and the HEP d.d. explicitly calls for measures to prevent that the same documentation has to be submitted several times for each project. Furthermore, it is suggested by HEP d.d. to make the obtained status as eligible producer valid for 12 years instead of the proposed 5 years. The result of this change would be alignment between the eligible producer status and the support contracts in terms of validity period, as the support agreements are valid throughout 12 years under the proposed scheme. Accordingly, the burden of renewing the status as eligible producer would be removed.

The CCE is concerned with the burden occurring from complicated process of obtaining licenses, certificates and other documents needed as pre-qualification for the auction and does not support adding additional procedures. CCE fears that competition may be reduced and investments negatively affected due to the requirement of obtaining an additional confirmation from the Croatian Transmission System Operator and Distribution System Operator. The CCE also considers the capital requirements too high.

Opinions on the bidding process and efficiency

While high pre-qualification criteria and great uncertainty may reduce the interest of investors, Dr. Ana-Maria Boromisa expresses in her blog that the new auction scheme is likely to bring more competition between green energy producers – an idea which is shared among several stakeholders. For instance, one stakeholder expresses that some investors may be scared off by the high requirements and the uncertainty (which lead to additional cost for financing), nevertheless many participants can be expected in the auctions due to the large amount of small producers in the renewable energy market.

It is generally expected that all bids will be serious thanks to the requirement of placing a first bid bond. Furthermore, it is argued that since a 'pay-as-bid' pricing rule is selected investors will calculate their bids carefully, and therefore underbidding behaviour is considered unlikely to happen.

Opinions on other issues

In his comment to the draft regulation Joseph Barbir points out that choosing the winning bids solely according to the offered price would leave those in favour who have access to attractive financing options. Thus, Croatian investors are likely to be outcompeted by their foreign counterparts. It is further claimed that having to pay out state support to foreign financially strong investors is not beneficial for Croatia, and there should therefore be included additional parameters in the selection of winning bid, which would improve the bidding position of Croatian bidders.

6 Preliminary expectations on the performance of the auction based on assessment criteria

Technology focus and differentiation

Under the auction scheme two ways of differentiation are described. First, the auction may contain separate quotas for different installation types. In the proposed scheme quotas can be determined for each installation type presented in Table 7. Second, bonus payments are available in terms of a correction factor on the reference market price. The regulation states the correction factors for solar power, wind power and other technologies.

The law on Renewable Energy and High-efficiency Cogeneration prescribes a separate auction scheme for power producers with capacities less than 30 kW, for which not a sliding premium but a guaranteed price is auctioned. This means that the small producers do not need to participate in the power exchange which is reasonable given their very small capacity.

The currently proposed auction design does not state specific quotas for each installation group. It does, however, state that technology quotas are to be determined by the Croatian government in accordance with both the Energy Strategy, the National Action Plan for Renewable Energy Sources (NREAP), National Action Plan for Energy Efficiency and other regulations (Article 28, Act). The NREAP capacity targets for 2020 have been presented in Table 2. Comparing this to the eligible producers' installed and contracted capacities presented in Table 4, it can be concluded for wind and solar power that actually no further development seems to be necessary until 2020: A target of 400 MW wind and 52 MW solar power contrasts with 744 MW

wind and 55 MW solar power of already installed and contracted capacities. In the domestic Energy Strategy, however, the wind power targets are somewhat more ambitious with 1200 MW until 2020. This leaves some room for additional wind capacities to be auctioned.

Geothermal power is not likely to be of special interest for the auctions, as the NREAP target is 10 MW, of which 10 MW are already contracted and under construction since November 2015 (Daskalovic, 2015).

New hydro power capacities are, according to the NREAP, expected to reach 400 MW by 2020 including 300 MW large and 100 MW small hydro power (<10 MW per plant) (Ministry of Economy, 2013). Recent newly installed capacity of small hydro power is approx. 3 MW, which is far below the 2015-target of 59 MW (compare Table 2and Table 4). Even when considering all contracted projects for small hydro power plants, this technology group remains far from its capacity target. The lack of installed capacity and contracted projects of small hydro power may allegedly be explained by lengthy permission obtaining processes due to strict environmental regulation and complex land ownership relations. Auctions may lead to a stronger financial incentive for engaging in small hydro projects – the barriers, however, are not directly related to financial incentives, so they must be addressed outside of the auction.

Large hydro power plants (>10 MW) can in principle also obtain status as eligible producer. As the specific auction design in regards of quotas for the different technologies is still open, it is unclear as of now if these plants will be allowed into the auction. In any case, it is considered unlikely that specific quotas will be offered for this technology group due to the fact that large hydro power is generally able to compete on regular market conditions and does not need additional support.

When all contracted biomass power plants (solid biomass and biogas) come into operation a total capacity of 175.8 MW will be reached, which already exceeds the overall 2020-target of 125 MW. Power plants fuelled with biomass are also expected to contribute to the cogeneration of power and heat and the installed biomass based cogeneration capacity target is 85 MW by 2020 (Ministry of Economy, 2013, Table 10b). Cogeneration of power and heat is politically prioritised in Croatia and high-efficiency cogeneration plants are included in the auction scheme. Given that coal is generally less expensive a fuel than biomass, there is a risk that biomass-fired cogeneration will be ousted by coal in the competition within the cogeneration quota of an auction. This issue could be addressed by simply having different quotas for the two installation types. Another option which may help biomass-fired cogeneration to be more competitive is to offer a bonus payment to biomass-fired plants, for instance through a down-adjusted reference market price leading to a larger premium.

In total, all contracts needed for reaching the 2020-targets presented in the NREAP have been signed, except for the case of hydropower. Approx. 92 MW of small hydro power is still needed, and if counting from the more ambitious targets for wind power as stated in the Energy Strategy an additional 456 MW could be auctioned.

Considering the limited amount of RES capacities required to reach the 2020 targets, it remains to be seen how large the auctioned volumes will be. For an auction to function properly a certain level of competition is required and this can only be achieved if a stable and high investor interest can be upheld, through offering sufficient capacities in each auction for each quota. This means that an auction should contain enough capacities that several projects may have a realistic chance of winning. With annual (or even semi-annual) auctions, there is not much room for technology and size differentiation through quotas without risking the loss

of sufficient competition. Conducting auction less often than once a year may not be favourable either in regards of creating a stable investment environment. In this respect, the option to differentiate through bonus or correction factor might be beneficially applied wherever possible. Here, finding the appropriate level is of course also an issue. The level of bonus or correction factor might have to be adjusted after each auction round based on the auction outcome and derived learnings. As the already adopted law on Renewable Energy and High-efficiency Cogeneration clearly defines the premium to be the difference between bid price and the reference market value, the only option to include bonuses is to adjust the reference market value.

Continuance (Socio-political feasibility)

Socio-political feasibility is an important factor for a successful implementation of new policies. One way of securing feasibility of the auctions for renewable energy support is continuance between present and new support schemes. Currently the feed-in tariff is based on technology type and capacity of an installation as presented in Table 3. Different tariffs are offered for different installation types and in this way reflecting the different cost of producing the power. The differentiation in the proposed auction scheme is similar to the one used under the existing feed-in tariff system, which may create a satisfactory level of continuance. However, it is not likely that the same level of differentiation is practically possible in the auctions (cf. paragraph above).

The most important differentiation is probably that of large and small installations (below 30 kW), where the new scheme grants small installations a separate auction with a guaranteed price rather than a sliding premium. The guaranteed purchase price scheme is similar to the traditional feed-in tariff scheme and is very much in line with the current support scheme (see Table 2). Especially the protection of small solar power producers will create some continuance in terms of involvement of many small actors such as households and small businesses – currently, most of the Croatian solar projects have a capacity of less than 30kW (Ministry of Economy, 2013). Another option would have been not to make small installations subject to auctions at all, but rather to continue with the old feed-in tariff scheme for them. In many other countries, this is deemed the most appropriate way of protecting small actors and it is also fully in line with the State Aid Guidelines (European Commission, 2014).

An open question remains in the treatment of large hydro power plants (>10 MW). Previously, no large hydro power plants have been granted financial support under the feed-in tariff scheme. As mentioned above, they can operate fully on market terms and are thus not dependent on financial support. However, if they are accepted as eligible producers into the auction, and pooled together with any other technology or size (assuming that a full differentiation into all groups of technology and sizes is infeasible), the risk of crowding-out becomes apparent: Large hydro plants are then likely to bid into the auction with very low bids (even lower than the reference price) which other technologies may not be able to match. This might then threaten the apparent overall aim of technology differentiation in continuance with the previous support scheme.

Policy Effectiveness and Efficiency

Based on the limited information available as of now, it is not possible to predict the effectiveness of the future auctions in terms of realisation rates. In general, adequate penalties are appropriate measures for ensuring effectiveness, as well as substantial pre-qualification criteria. Both seem to be in place in the current draft of the bylaw.

There are rather strict delivery requirements for the contracted installations. Depending on the voltage level they are to be connected to, the grace period is 1-4 years from contracting. The periods are not deemed to be overly harsh on the developers. However, after that period, there is no further delay possible. In the current draft of the bylaw it seems that contracts are cancelled immediately after the grace period is passed. This might decrease the realisation rate somewhat in comparison to a scheme in which additional incentives are given to finalise delayed projects, e.g. through stepping up penalty payments (either in form of one-off payments, reduction of support level or support durations).

Regarding policy efficiency, the auction design brings the possibility to let technologies and producers compete with each other, and thus finding the least expensive mix of eligible production to reach the overall RES targets. However, it is still unclear to what extent the options of technology differentiation through quota setting and bonus schemes will be applied in the auction. An extensive use of differentiation may affect efficiency, distorting the competition between technology groups or obliterating it completely. This negative effect on static efficiency may, however, be acknowledged and accepted by the policy makers in favour of some of the other criteria, such as socio-political feasibility and actor diversity.

Minimisation of support costs

One can observe that there has been great interest in investing in renewable energy under the previous feed-in tariff, leading to a situation in which the contracted capacities are already today reaching the EU 2020 targets. This could be a sign that the tariff levels have been set rather high. Thus, introducing competition to determine support may lead to a reduction in support levels.

However, the auction scheme will bring uncertainty to the investment, which can increase the cost of capital and prevent some investors from participating in the auctions. A significant increase in the capital cost is likely to be reflected in the bids. This is especially the case as the Croatian government has chosen the pay-as-bid pricing rule. From a theoretic perspective, the uniform pricing rule is expected to give a somewhat stronger incentive to place true cost bids, whereas one can expect some ‘add-ons’ to the bids under a pay-as-bid pricing (source: AURES Auction Acadamy #5 (Haufe & Tiedemann, 2016)). In practice, however, the uniform pricing rule creates other issues, especially for newly established auction schemes and unexperienced bidders: There is a risk of irrational behaviour, and often investors are misled to put in zero bids, which can create substantial market distortions and may lead to failure of the auction as a whole. Therefore, the slight increase of bid levels that can be expected under the pay-as-bid pricing may be acceptable and the chosen pricing rule seems well justified for Croatia.

Another issue that might impact support costs are the financial requirements, e.g. in form of bank guarantees. If these are considered too high and also the process of preparing bids too complicated, small investors would not join the auction process. This could reduce the competition and eventually push up support levels.

Actor diversity and social acceptability

A certain level of actor diversity is important for securing the functioning of the auction scheme: It is of utmost importance that true competition is in place in each auction round and technology category. True competition can only be achieved if a number of independent actors are readily available for bidding on equal terms. In an energy market with one dominant actor, there exists a risk of auctions being dominated by that actor, affecting the auction outcome and consequently the support levels. In Croatia, the state owned HEP group owns approx. 89% of all generation capacity and contributes to green energy production through several hydropower plants (owned by HEP Proizvodnja d.o.o). While the HEP group is currently not a strong actor among eligible producers their interest in acquiring RES projects under development was announced in January 2015. Until 2017, the HEP group is reportedly looking to invest EUR 4.7 billion in wind projects, projects of solar power plants with a total capacity of >300 MW, small hydro power projects as well as projects for biomass and biogas plants (Reuters, 2015).

Currently, a high number of different actors take part in green energy production as shown in Table 4. They own, naturally, mostly small installations. In order to ensure actor diversity under the auction scheme, attention should be given to market entry barriers and prequalification criteria. High prequalification requirements, such as strong financial viability, may exclude smaller project developers from the auctions, thus enhancing the dominant position of the incumbent.

It might be necessary to attract large international players to establish a competitive balance on the Croatian market. This can be secured by a high level of transparency, including making information available in English; lowering barriers such as company registration and obtaining status as eligible producer; and by engaging in active dialogue with foreign investors to attract their attention to the upcoming auctions. Experiences from Denmark have shown that this strategy can be successful in attracting foreign investors into a small market where auctions have been dominated by domestic players (and mostly one rather dominant company) (Kitzing & Wendring, 2015).

Another issue for foreign investors as well as smaller domestic actors might be the newness of the spot market. The reference price will partially be calculated based on trades on CROPEX, which has no track record yet. Prices might be rather volatile, which could be an issue for non-incumbents, if they are also relying on selling their power on that market, e.g. if they have no access to sound bilateral trades. The current draft regulation mitigates this issue somewhat by referring to the Slovenian and Hungarian power prices in the calculation of the reference price as well. It remains to be seen if this actually helps in decreasing risk for investors.

7 Conclusions

With its new Act on Renewable Energy Sources and High-efficiency Cogeneration, Croatia is introducing a competitive element in the state support offered to renewable energy producers, which seems to be in line with EU guidelines. The proposed design also seems to be in line with the European principles of market integration as the installations awarded a sliding premium will also assume balancing responsibilities.

Several features of the scheme are similar to those of the auction implemented in Germany, which could be an indication of knowledge sharing and learning from the German experiences.

But unlike the German scheme, the auctions in Croatia are designed to span across different renewable energy technologies as well as high-efficiency cogeneration. At the same time a wish to maintain differentiation in support levels between installations is indicated by introducing many installation categories, technology specific requirements and correction factors for remuneration. Because of that the scheme appears rather complicated.

The apparent lack of information on the auction volumes and specific capacity quotas to be auctioned seems to be a major issue. Given that almost all 2020-targets defined in the National Action Plan for Renewable Energy Sources are already achieved (when considering all contracted capacities), it is questionable if the auctions will contain large volumes. If dedicated quotas are defined for each installation category, the separate volumes allowed per auction will probably be extremely limited, though depending on political decisions on the future RES development in Croatia. This could reduce investors' interest in the auction scheme, and therefore impede competition.

Another issue with assigning quotas to each installation type is that only the project holders in that specific installation group are to compete with each other within the quota, which may drastically reduce overall competition. Even though there are many investors in the renewable energy market, their number in some installation categories may be rather limited. Whether the number of bidders will be enough for securing sufficient competition is still to be seen.

The auction scheme was allegedly introduced in order to comply with EU regulation, that is, following the new EU Guidelines on state aid for environmental protection and energy 2014-2020 (European Commission, 2014). Indeed, competitive bidding is one of the cornerstones in the guidelines. However, in cases where competition is expected to be limited or the budget for the scheme is small, the guidelines allow exemptions from the principle of competitive bidding (European Commission, 2014, Article 243). It may be questioned whether the volumes to be auctioned and thereby the support budgets will be large enough to support the idea that introduction of competitive bidding was an absolute necessity, especially also for the small installation sizes of <30 kW, for which the state aid guidelines explicitly describe possible exemptions from the competitive bidding process (European Commission, 2014, Article 127). Nevertheless, final conclusions cannot be drawn before the auction volumes have been determined. Renewable targets may be subjected to

political changes, and the new scheme might also be used as tool to preempt issues with future RES targets, e.g. for the period after 2020.

It should be kept in mind that the implementing bylaws of the auction scheme are yet to be adopted, and the draft version which was used for analysis in this report may still be subjected to major changes.

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